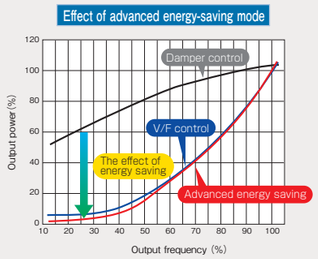
TOSHIBA

Variable torque Drive

TOSVERT™ VF-PS1

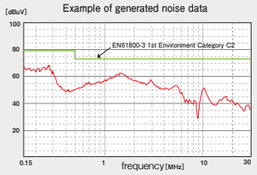
point 1 More energy saving

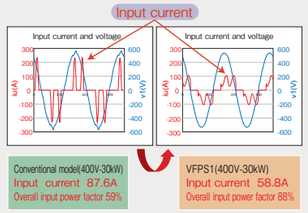
The advanced energy-saving mode optimizes fan and pump efficiency even if low speeds.
The effect can be monitored by operation panel or through serial communication data.
This makes it ideals for exhaust fan, primary pump, boiler and feed water pump that require energy saving.



point 2 High-frequency noise reduction and harmonics reduction

The integrated noise filter*1 and DC reactor*1 drastically reduce high-frequency noise and harmonics which are generated from an inverter, and the power factor also improved.
This reactor limits the input current within 110% of the rated output current. It saves power and reduces running cost of power supply system.
This makes it ideals for HVAC fan and pump. *1 Refer to Standard Specifications.





point 3 Special softwares for fan and pump application are built-in

Ideal functions are built-in for fan and pump application.
◆Bumpless function realize seamless operation between local and remote
◆Fire control enables forced operation in emergency
◆Speed reference can manage on/off operation(sleep function)
◆Multi-PID control with direct and reverse operation
◆Low torque detection can notice a broken belt
◆PTC thermistor input
◆The MY function allows you to program logic and internal data operations
RS485(TOSHIBA/Modbus protocol)communications is equipped as standard,DeviceNet®*2, PROFIBUS, CC-Link®*2, LonWorks®*2, BAC net®*2, Metasys®N2*2, and APOGEE®FLN*2 fieldbuses are supported as options.

Fieldbus Option

*2 DeviceNet is a registered trademarks of ODVA (Open DeviceNet Vendor Association).
CC-Link is a registered trademarks of Mitsubishi Electric Corporation
LonWorks® is a registered trademark of Echelon Corporation.
BACnet® is a registered trademark of American Society of Heating, Refrigerating and Air-Conditioning Engineers, Incorporated.
Metasys® is a registered trademark of Johnson Controls, Incorporated.
APOGEE® is a registered trademark of Siemens Building Technologies, Incorporated.

point 4 Simple Setup by EASY Key and Easy Maintenance

In the Quick mode, pressing the EASY key on the panel allows you to operate the inverter by eight basic parameters.
You can customize the Quick mode display, maximum of 32 target parameters are displayed to suit your specific setup requirements.
An alarm warns when the main circuit capacitors, circuit boards capacitors, or cooling fan needs to be replaced. This makes it ideals for exhaust fan, dust collector, drier machine and water pump.
*3 Photos of machinery are for illustrative purposes only.

EASY key

Quick mode (EASY)

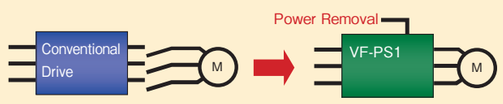
Title	Function
AU4	Parameter setting macro function
Pt	V/F control mode selection
FH	Maximum frequency
ACC	Accelertion time 1
dEC	Deceleration time 1
tHr	Motor overload protection level 1
FM	FM terminal meter selection
PSEL	Parameter display selection

Compatible with the World's Main Standards
CE marking, UL, CSA, RCM

- Built-in thermal protection function which complies with NEC® 2005
- Comply with SEMI F47 (Semiconductor Equipment and Materials International)

"Power Removal"safety function

Built-in Power Removal safety function which complies with EN954-1 category 3 and IEC/EN61508-1 SIL2.
It saves the installation of a line side or motor side contactor.



Voltage class	Applicable Motor Output(kW)																												
	0.4	0.75	1.5	2.2	3.0	4.0	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	200	220	250	280	315	400	500	630
3-phase 200V class (IP20/IP00)	■	■	■	■	■	■	■	■	■	■																			
3-phase 400V class (IP20/IP00)											■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
3-phase 400V class (IP54)											■	■	■	■	■	■	■	■	■										
3-phase 690V class (IP20/IP00)																				■	■	■	■	■	■	■	■	■	■

Up to 5.5kW, 3-phase 200V class can be applied to 1-phase input power supply by using 1 size-up rating.

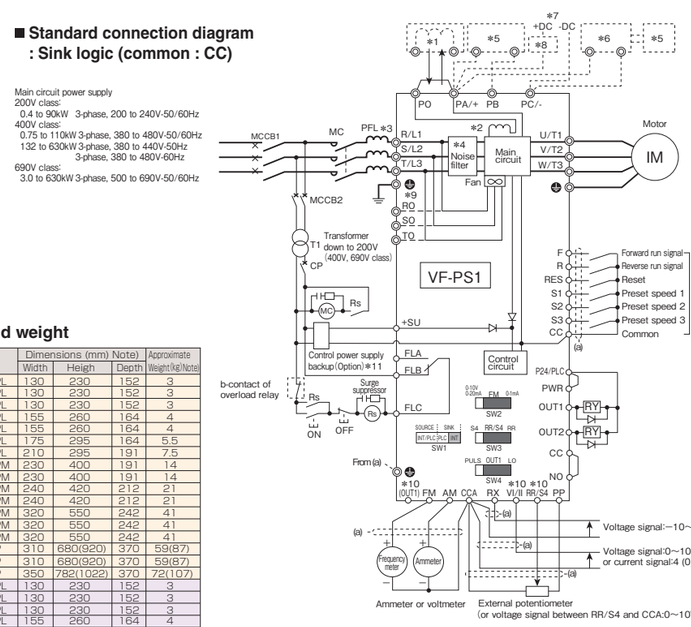
Standard type

■ Standard specifications VF-PS1

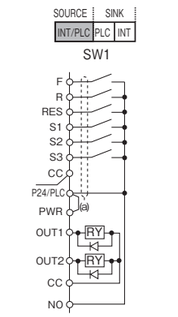
Item			Specification
Applicable motor (kW)			0.4 / 0.75 / 1.5 / 2.2 / 3.0 / 4.0 / 5.5 / 7.5 / 11 / 15 / 18.5 / 22 / 30 / 37 / 45 / 55 / 75 / 90 / 110 / 132 / 160 / 200 / 220 / 250 / 280 / 315 / 400 / 500 / 630
Type Form	Type		VFPS1–
	3-phase 200V class		2004PL / 2007PL / 2015PL / 2022PL / – / 2037PL / 2055PL / 2075PL / 2110PM / 2150PM / 2185PM / 2220PM / 2300PM / 2370PM / 2450PM / 2550P / 2750P / 2900P / – / – / – / – / – / – / – / – / – / – / –
	3-phase 400V class		– / 4007PL / 4015PL / 4022PL / – / 4037PL / 4055PL / 4075PL / 4110PL / 4150PL / 4185PL / 4220PL / 4300PL / 4370PL / 4450PL / 4550PL / 4750PL / 4900PC / 4110KPC / 4132KPC / 4160KPC / – / 4220KPC / 4250KPC / 4280KPC / 4315KPC / 4400KPC / 4500KPC / 4630KPC
	3-phase 690V class		– / – / – / – / 6030PL / – / 6055PL / 6075PL / 6110PL / 6150PL / 6185PL / 6220PL / 6300PL / 6370PL / 6450PL / 6550PL / 6750PL / 6900PL / 6110KPC / 6132KPC / 6160KPC / 6200KPC / – / 6250KPC / – / 6315KPC / 6400KPC / 6500KPC / 6630KPC
Rating	Capacity (kVA) Note1)	200V class	1.1 / 1.8 / 3.0 / 4.2 / – / 6.7 / 10 / 13 / 21 / 25 / 29 / 34 / 46 / 55 / 67 / 84 / 109 / 137 / – / – / – / – / – / – / – / – / – / – / –
		400V class	– / 1.8 / 3.1 / 4.4 / – / 8.0 / 11 / 13 / 21 / 25 / 31 / 37 / 50 / 60 / 72 / 88 / 122 / 136 / 164 / 197 / 239 / – / 325 / 367 / 419 / 469 / 578 / 717 / 905
		690V class	– / – / – / – / 5.4 / – / 9.0 / 12 / 17 / 23 / 29 / 35 / 42 / 57 / 71 / 82 / 102 / 125 / 150 / 180 / 215 / 263 / – / 347 / – / 424 / 502 / 649 / 806
	Output current (A) Note2)	200V class	3 / 4.8 / 8 / 11 / – / 17.5 / 27.5 / 33 / 54 / 66 / 75 / 88 / 120 / 144 / 176 / 221 / 285 / 359 / – / – / – / – / – / – / – / – / – / – / –
		400V class	– / 2.3 / 4.1 / 5.8 / – / 10.5 / 14.3 / 17.6 / 27.7 / 33 / 41 / 48 / 66 / 79 / 94 / 116 / 160 / 179 / 215 / 259 / 314 / – / 427 / 481 / 550 / 616 / 759 / 941 / 1181
		690V class	– / – / – / – / 4.5 / – / 7.5 / 10 / 13.5 / 18.5 / 24 / 29 / 35 / 47 / 59 / 68 / 85 / 104 / 125 / 150 / 180 / 220 / – / 290 / – / 355 / 420 / 543 / 675
Power supply	Voltage / frequency		200V class : 3-phase 200 to 240V-50/60Hz 400V class 0.75 to 110kW : 3-phase 380 to 480V-50/60Hz 400V class 132 to 630kW : 3-phase 380 to 440V-50Hz, 380 to 480V-60Hz 690V class : 3-phase 500 to 690V-50/60Hz
	Allowable ˝uctuation		Voltage +10%, -15% (±10% when the inverter is used continuously (load of 100%)), Flequency ±5%
Rated output voltage			3-phase 200 to 240V : 200V class, 3-phase 380 to 480V : 400V class, 3-phase 500 to 690V : 690V class (The maximum output voltage is same as the input source voltage.)
Output frquency range			0.01 to 500Hz (Default setting 0.01 to 60.0/50.0Hz)
Overload current rating			120%-60seconds, 135%-2seconds(Inverse time-lag characteristic)
Dynamic breaking circuit			Built-in dynamic breaking circuit : 0.4 to 220kW (3.0 to 200kW : 690V class), External option: 250kW or more
Dynamic breaking resistor			External option
Main functions			Parameter setup quick mode, Local / remote operation, Automatic energy saving mode, programmable I/O terminal block, multi-PID control, Fire control enables forced operation, My function
Ambient temperature			-10 to 60°C (Remove the upper cover when over 40°C. Current decrease when over 50°C) : 200V class 0.4 to 45kW, 400V class 0.75 to 75kW, 690V class 3.0 to 90kW -10 to 60°C (Current decrease when over 45°C) : 200V class 55 to 90kW, 400V class 90 to 630kW, 690V class 110 to 630kW
Relative humidity			5 to 95% (free from condensation and vapor)
Protected method			IP20: 200V class 0.4 to 15kW, 400V class 0.75 to 18.5kW, 690V class 3.0 to 90kW IP00: 200V class 18.5 to 90kW, 400V class 22 to 630kW, 690V class 110 to 630kW
Cooling method			Forced air cooling
Built-in ỳlter			EN55011 classA, EN61800-3 category C2 compliant (built-in EMI noise ỳlter) : 200V class 0.4 to 1.5kW, 400V class 0.75 to 4.0kW EN55011 classA, EN61800-3 catego ry C3 compliant (built-in EMI noise ỳlter) : 200V class 2.2 to 7.5k W, 400V class 5.5 to 630kW, 690V class 3.0 to 630kW Basic ỳlter (Not complies EMC standard) : 200V class 11 to 45kW
Built-in reactor			Built-in DC reactor : 200V class 11 to 45kW, 400V class 18.5 to 75kW, 690V class 3.0 to 90kW Attached DC reactor : 200V class 55 to 90kW, 400V class 90 to 630kW AC reactor : 690V class 110 to 630kW

Note1) Capacity is calculated at 220V for the 200V class, at 440V for the 400V class and at 690V for the 690V class.
Note2) Rated output current when the PWM carrier frequency (parameter CF) is following. 200V/400V class : 4kHz or less , 690V class : 2.5kHz

■ Standard connection diagram : Sink logic (common : CC)



■ Standard connection diagram : Source logic (common : P24)

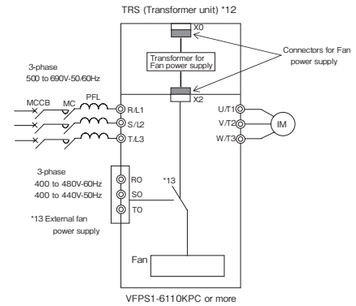


■ External dimensions and weight

Input voltage Class	Applicable motor (kW)	Inverter type	Dimensions (mm) Note) Width	Heigh	Depth	Approximate Weight (kg) Note)
3-phase 200 V	0.4	VFPS1-2004PL	130	230	152	3
	0.75	VFPS1-2007PL	130	230	152	3
	1.5	VFPS1-2015PL	130	230	152	3
	2.2	VFPS1-2022PL	155	260	164	4
	4.0	VFPS1-2037PL	155	260	164	4
	5.5	VFPS1-2055PL	175	295	164	5.5
	7.5	VFPS1-2075PL	210	295	191	7.5
	11	VFPS1-2110PM	230	400	191	14
	15	VFPS1-2150PM	230	400	191	14
	18.5	VFPS1-2185PM	240	420	212	21
	22	VFPS1-2220PM	240	420	212	21
	30	VFPS1-2300PM	320	550	242	41
	37	VFPS1-2370PM	320	550	242	41
	45	VFPS1-2450PM	320	550	242	41
	55	VFPS1-2550P	310	680(920)	370	59(87)
	75	VFPS1-2750P	310	680(920)	370	59(87)
	90	VFPS1-2900P	350	782(1022)	370	72(107)
3-phase 400 V	0.75	VFPS1-4007PL	130	230	152	3
	1.5	VFPS1-4015PL	130	230	152	3
	2.2	VFPS1-4022PL	130	230	152	3
	4.0	VFPS1-4037PL	155	260	164	4
	5.5	VFPS1-4055PL	175	295	164	5.5
	7.5	VFPS1-4075PL	175	295	164	5.5
	11	VFPS1-4110PL	210	295	191	8
	15	VFPS1-4150PL	230	400	191	13
	18.5	VFPS1-4185PL	230	400	191	16
	22	VFPS1-4220PL	240	420	212	21
	30	VFPS1-4300PL	240	550	242	29
	37	VFPS1-4370PL	240	555	242	29
	45	VFPS1-4450PL	320	630	290	48
	55	VFPS1-4550PL	320	630	290	48
	75	VFPS1-4750PL	320	630	290	48
	90	VFPS1-4900PC	310	680(920)	370	59(87)
	110	VFPS1-4110KPC	310	680(920)	370	59(87)
	132	VFPS1-4132KPC	350	782(1022)	370	74(108)
	160	VFPS1-4160KPC	330	950(1190)	370	82(118)
	220	VFPS1-4220KPC	430	950(1190)	370	104(161)
	250	VFPS1-4250KPC	585	950(1190)	370	134(194)
	280	VFPS1-4280KPC	585	950(1190)	370	136(204)
	315	VFPS1-4315KPC	585	950(1190)	370	136(204)
	400	VFPS1-4400KPC	880	1150(1390)	370	215(302)
	500	VFPS1-4500KPC	880	1150(1390)	370	225(330)
	630	VFPS1-4630KPC	1108	1150(1390)	370	330(462)
3-phase 690 V	3.0	VFPS1-6030PL	240	420	212	21
	5.5	VFPS1-6055PL				
	7.5	VFPS1-6075PL				
	11	VFPS1-6110PL				
	15	VFPS1-6150PL				
	18.5	VFPS1-6185PL				
	22	VFPS1-6220PL				
	30	VFPS1-6300PL				
	37	VFPS1-6370PL	320	630	290	48
	45	VFPS1-6450PL				
	55	VFPS1-6550PL				
	75	VFPS1-6750PL				
	90	VFPS1-6900PL				
	110	VFPS1-6110KPC	330	950 (1190)	370	82 (110)
	132	VFPS1-6132KPC				
	160	VFPS1-6160KPC				
	200	VFPS1-6200KPC	585	950 (1190)	370	134 (190)
	250	VFPS1-6250KPC				
	315	VFPS1-6315KPC				
	400	VFPS1-6400KPC				
	500	VFPS1-6500KPC	1108	1150 (1390)	370	330 (400)
	630	VFPS1-6630KPC				

Note : Value in ( ) includes attached DC reactor for the 200V/400V class and attached TRS (Transformer) for the 690V class.

*1 : The inverter is shipped with the terminals PO and PA/+ shorted with a bar (200V-45kW or less, 400V-75kW or less and 690V-90kW or less). Remove this shorting bar when installing a DC reactor (DCL). For 200 V - 55 kW or more, and 400 V - 90 kW or more models, be sure to install the DC reactor.
*2 : The DC reactor is built in for models 200V-11kW~45kW, 400V-18.5kW~75kW and 690V-3.0~90kW.
*3 : For 690V-110kW or more, be sure to install the AC reactor (option).
*4 : The noise filter is built in for models 200V-45kW or less, all of 400V and all of 690V.
*5 : External braking resistor (option). Dynamic braking drive circuit built-in (GTR7) as standard for models 220kW (200kW for 690V) or less.
*6 : Power generation braking Unit (option). When the external braking resistor (option) is used on 200kW or more models, the separate power braking unit (option) is required.
*7 : To supply a DC power, connect the cables to the PA/+ and PC/- terminals (Except 690V models).
*8 : If you want to use a DC power supply to operate the inverter (200V: 18.5kW or more, 400V: 22kW or more), be sure to contact your supplier customer support center, because an inrush current limiting circuit is required in such a case.
*9 : For models 200V-75kW and 400V-110kW or more, three-phase power input is necessary to drive the fan if you want to use a DC power supply.
*10 : The functions assigned to terminals OUT1, VI/II and RR/S4 can be switched by changing parameter settings. The internal impedance between VI/II terminal and CCA is high when the inverter control power cut off. Please put a resistor (1/2W-470 ohms) between VI/II and CCA to avoid mis-detecting the current input signal error.
*11 : To supply control power from an external power supply for backing up the control power supplied from the inverter, an optional control power backup device (CPS002Z) is required. In such a case, the backup device is used at the same time with the internal power supply of the inverter. The optional control power backup unit can convert 200V~480Vac to 24Vdc.



*12 : 690V-110kW or more models are necessary to supply operation power for cooling fans, TRS (Transformer for fan power supply) connect to cooling fans as follows .
*13 : In case of using external fan power supply instead of TRS, it is necessary to change the connection of the fan power supply inside of the inverter.

Totally enclosed box type for IP54/UL type 12

point 1 Totally enclosed box type for IP54/UL type 12

• IP54 protection for direct mounting on a wall

point 2 High-frequency noise reduction

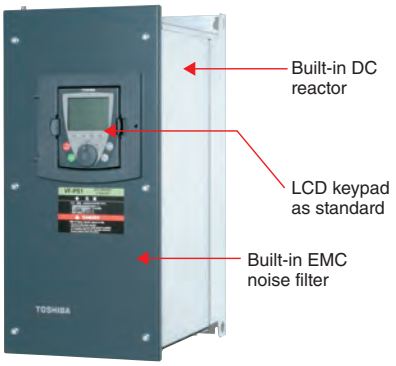
• IP54 product with EN 55011 class A or class B (IEC/EN 61800-3) built-in EMC filters

point 3 Harmonics reduction

• New types of compact and space-saving DC reactor is built-in for all models

point 4 LCD keypad as standard

• Possible for palm top operation

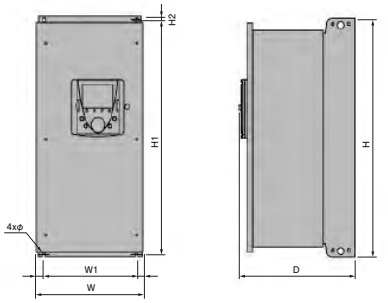


Standard specifications

Item		Specification															
Applicable motor (kW)		0.75	1.5	2.2	4.0	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90
Type Form	Type	VFPS1–															
	Form	4007PLE 4007PDE	4015PLE 4015PDE	4022PLE 4022PDE	4037PLE 4037PDE	4055PLE 4055PDE	4075PLE 4075PDE	4110PLE 4110PDE	4150PLE 4150PDE	4185PLE 4185PDE	4220PLE 4220PDE	4300PLE 4300PDE	4370PLE 4370PDE	4450PLE 4450PDE	4550PLE 4550PDE	4750PLE 4750PDE	4900PLE 4900PDE
Rating	Capacity(KVA)Note 1)	1.8	3.1	3.9	6.9	9.1	12.0	17.0	23.0	28.0	33.0	45.0	54.0	65.0	78.0	104.0	124.0
	Output current(A) Note 2)	2.3	4.1	5.1	9.1	12	16	22.5	30.5	37	43.5	58.5	71.5	85	103	137	163
Power supply	Voltage/frequency	3-phase 380 to 480V, 50/60 Hz															
	Allowable fluctuation	Voltage +10%, -15% (±10% during continuous 100% load) Frequency ±5%															
Rated output voltage		3 phase 380 to 480V : 400V class (The maximum output voltage is same as the input source voltage)															
Output frequency range		0.01 to 500 Hz (Default setting 0.01 to 60.0/50.0 Hz)															
Overload current rating		110%-60 seconds(Inverse time-lag characteristic)															
Dynamic breaking circuit		Built-in dynamic breaking circuit															
Dynamic breaking resistor		External option															
Main functions		Parameter setup quick mode, Local/remote operation, Automatic energy saving mode, programmable I/O terminal block, multi-PID control, Fire control enables forced operation, My function															
Ambient temperature		-10 to 50°C (current decreases when over 40°C)															
Relative humidity		5 to 95% (free from condensation and vapor)															
Protective method		IP54/UL type 12															
Cooling method		Forced air cooling															
Built-in filter		EN55011 class A, EN61800-3 category C2 compliant (built-in EMI noise filter) :PLE type 0.75 to 5.5kW EN55011 class A, EN61800-3 category C3 compliant (built-in EMI noise filter) :PLE type 7.5 to 90kW EN55011 class B, EN61800-3 category C1 compliant (built-in EMI noise filter) :PDE type															
Reactor		Built-in DC reactor															

Note 1) Capacity is calculated at 440V
Note 2) Rated output current when the PWM carrier frequency(parameter CF) is 8kHz or less.

External dimensions



Input voltage Class	Applicable motor (kW)	Inverter type Note 1)	Dimensions (mm) W	H	D	W1	H1	H2	ø	Approximate Weight(kg) Note 1)
3-phase 400 V	0.75	VFPS1-4007PLE(PDE)	240	490	261	200	476	6	6	13(15)
	1.5	VFPS1-4015PLE(PDE)								
	2.2	VFPS1-4022PLE(PDE)								
	4.0	VFPS1-4037PLE(PDE)	240	490	275	200	476	6	6	16(18)
	5.5	VFPS1-4055PLE(PDE)								
	7.5	VFPS1-4075PLE(PDE)	260	525	275	220	511	6	6	20(23)
	11	VFPS1-4110PLE(PDE)								
	15	VFPS1-4150PLE(PDE)	296	560	304	250	544	8	6	25(29)
	18.5	VFPS1-4185PLE(PDE)	315	665	305	270	647	10	6	36(41)
	22	VFPS1-4220PLE(PDE)								
	30	VFPS1-4300PLE(PDE)	285	720	301	245	700	10	7	34(39)
	37	VFPS1-4370PLE(PDE)	285	880	332	245	860	10	7	43(49)
	45	VFPS1-4450PLE(PDE)								
	55	VFPS1-4550PLE(PDE)	362	1000	353	300	975	10	9	69(80)
	75	VFPS1-4750PLE(PDE)								
	90	VFPS1-4900PLE(PDE)								

Note 1) The values in parentheses refer to PDE type,
VFPS1-****PLE:Built-in class A EMC filter, VFPS1-****PDE:Built-in class B EMC filter

Standard connection diagram

See the Standard connection diagram for Standard type.

For users of the products : Our variable speed drives are designed to control the speeds of three-phase motors for general industry.

⚠ Precautions

* Please read the instruction manual before installing or operating the drive unit.
* This product is intended for general purpose uses in industrial application. It cannot be used applications where may cause big impact on public uses, such as power plant and railway, and equipment which endanger human life or injury, such as nuclear power control, aviation, space flight control, tra˜ic, safety device, amusement, or medical. It may be considerable whether to apply, under the special condition or an application where strict quality control may not be required. Please contact our headquarters, branch, or local o˜ices printed on the front and back covers of this catalogue.
* When exporting Toshiba variable speed drive separately or combined with your equipment, please be sure to satisfy the objective conditions and inform conditions listed in the export control policies, so called Catch All restrictions, which are set by the Ministry of Economy, Trade and Industry of Japan, and the appropriate export procedures must also be taken.
* Please use our product in applications where do not cause serious accidents or damages even if product is failure, or please use in environment where safety equipment is applicable or a backup circuit device is provided outside the system.
* Please do not use our product for any load other than three-phase motors.
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For further information, please contact your nearest Toshiba Representative or International Operations-Producer Goods.
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Toshiba Industrial Products and Systems Corporation

Global Sales Department Motor Drive Division

580, Horikawa-cho, Saiwai-ku, Kawasaki, Kanagawa 212-0013, Japan Tel : +81-44-520-0828 Fax : +81-44-520-0508

http://www.toshiba-tips.co.jp/en/

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